Presentation to DOT Workshop

March 12, 2015

LightSquared Comments on Testing Program

- The FCC has Exclusive Jurisdiction to Regulate Spectrum Emissions
- The Established Process is for Agencies to Ask the FCC to Conduct Such Studies
- The Only Purpose of Any Such Study is to Inform FCC Regulatory Action
  - If DOT does enter into an agreement with Volpe to perform a study, it should make sure the work is useful to the FCC
- In Order for a Study to be Useful
  - It must be based on a published, detailed test plan
  - Testing should inform the FCC's consideration of economic and social issues
  - The study's conclusions must be capable of being proved true or false by a competing study
  - The evidence used must be available for LightSquared or others to study
  - The study must begin and end in 2015
  - The study should adduce evidence relevant to "actual harm"
  - The study should identify the gold standard of GPS resiliency

Appropriate Elements of Study

- Overall Roles and Responsibilities
  - DOT to gather all relevant datasets, position and timing error for widely used GPS devices
  - Full dataset, along with DOT perspective, shall be submitted to NTIA and FCC for review, public comment and action
  - Subject to confidentiality protection for proprietary elements, dataset should be capable of testing by LightSquared
- Scope
  - Downlink spectrum band only
- Focus of Assessment
  - Position / timing error
  - Change in C/N_0
  - Providing detailed test results for both elements is essential
    - Positional and timing variance is what matters to determine “actual harm”
    - Signal/noise is a very poor proxy.
- All Testing to be Performed by Volpe or Qualified Independent Laboratories

Devices for Testing

- The Devices Tested Should Cover:
  - Top selling devices for 2014 by SKU and seller
  - Top selling devices 2004-2013 that manufacturers believe are still in widespread use
    - Supporting information to DOT
    - Ability to provide test samples to DOT
  - Devices that are newly released in 2015 or ready for release with test devices available
- For Each Model Provided To DOT for Testing; Volpe Will Test two Identical Units
  - If units fail to achieve consistent results in confirmational testing; an additional two units will be provided
- Manufacturers to Make Identical Devices, “Test Mode” Software Codes, and Any Necessary Data Collection Cables Available to 3rd Parties For Parallel Testing
  - DOT can use confidentiality agreements to protect proprietary elements
- GPS Receive Antenna Patterns to be Made Available in Order to Perform Subsequent Use-Case Analyses
- The Frequency Selectivity Curve and Linearity of the Receiver Front-End for all Devices to be Provided to DOT (and FCC)
- Manufacturers to Provide Description of Typical Use Cases for Devices Submitted
- LightSquared to Have Same Information and Access in Order to Perform its Own Tests

Testing Process and Output

- Conducted Testing Will be Performed When Feasible; Otherwise Over-the-Air Testing Will be Performed
- Adjacent Band Power Will be Measured at the GPS Antenna Connector (or Immediately Adjacent to the Antenna for Over-the-Air Testing)
  - Eliminates need for propagation model assumptions in the analysis process
- All Test Results, Including Full Device Identities, to be Publicly Released on a Rolling Basis as Testing is Completed
- In Order to Provide a Complete Data Set to NTIA and the FCC, DOT to Create a Series of Receiver Masks to Illustrate the Impact of the Adjacent Band on Different Classes of Devices
  - Mask representing all devices within a category
  - Mask which eliminates the 15% of devices with the poorest rejection of adjacent band signals
  - Mask which shows the top 50% of devices with respect to rejection of adjacent band signals
- Multi-GNSS Receivers Will not be Tested Since There is Currently no Authorization for Non-GPS Satellite Receivers to Be Used in the United States
- “Gold Standard” to be Assessed

Openness and Transparency

- Creation of an “Issues Log” to Track All Items Raised at Workshops and Private Meetings; Updated and Released Weekly
  - Date
  - Description
  - Status
  - Resolution
  - Responsible Party
- Public Availability of Information
- Confidentiality Would be Afforded to Proprietary Information Only
  - Specific sales volumes for devices
  - Device front-end information (such as frequency selectivity and linearity of devices submitted for testing)
- All Communications and Materials Presented at Meetings Between DOT and Study Participants Outside of Workshops to be Posted to the DOT ABC Website
- Audio Recording of Future Workshops to be Available at the DOT ABC Website in Addition to the Meeting Materials

Key Milestones

Redraft of Current Test Plan, Public Comment and Final Draft Released	5/4/2015
Devices to be Tested Provided to Volpe by Manufacturers	5/18/2015
Lab Setup Complete / Final Test Plan Issued	5/25/2015
Device Testing Begins	5/25/2015
Test Results Released	Rolling
Device Testing Complete	8/26/15
Final Results Submitted to NTIA/FCC (No Interference Standards to be Recommended)	9/30/2015